NIOSH Traumatic Injury Research Program

Monitoring Progress in Implementing the National Academies' Program Evaluation Recommendations: *A Report to the NIOSH Board of Scientific Counselors*

August 2012

Introduction

The National Institute for Occupational Safety and Health (NIOSH) Traumatic Injury (TI) Research Program underwent a systematic review for relevance and impact by the National Academies (NA) beginning in 2007. The NA concluded in their 2009 report[1] that the program conducted research "in priority areas and led to demonstrated effects on some end outcomes or on well-accepted intermediate outcomes." On the basis of a scale of 1 (low) to 5 (high), the NA assigned the program scores of 4 for both relevance and impact. The NA offered nine overarching recommendations for improvement that encompassed strategic planning, coordination and collaboration, workforce development, transfer activities, and the changing nature of work.

In 2009, the TI Research Program developed a draft implementation plan that included revisions to the TI Strategic Plan. The draft implementation plan was presented to the NIOSH Board of Scientific Counselors (BSC) and posted to the NIOSH docket for public comment. No public comments were received. The implementation plan[2] was finalized in 2010 reflecting BSC comments and recommendations.

Although work and progress continues on all of the NA recommendations, this document reports the program's progress in implementing five selected recommendations. The five recommendations were selected because of their potential to enhance the relevance and impact of the program and the ability to address future emerging traumatic injury issues. The five selected recommendations encompass strategic planning, coordination and collaboration, and the changing nature of work. The Appendix includes brief updates and comments on the four NA recommendations not addressed in this document.

The TI Research Program encompasses intramural and extramural research. Much of the intramural research is conducted in the Division of Safety Research (DSR) which serves as the focal point within NIOSH for traumatic injury research. However, considerable traumatic injury research is conducted in other NIOSH Divisions, Laboratories and Offices (DLOs) and extramurally. The program is overseen by a program manager who is also the DSR Director. The program manager relies on the multi-disciplinary TI Steering Committee with representation from all DLOs conducting traumatic injury research, including the Office of Mining Safety and Health Research, and the Office of Extramural Programs (OEP), to ensure that the program addresses all high risk industry sectors, is reflective of the breadth and richness of NIOSH expertise, and encompasses extramural research.

When the TI Research Program was evaluated by the NA in 2007, mining research was specifically excluded from the review because the intersecting Mining program had recently undergone a separate NA review. Therefore, for the purposes of this progress report, projects and activities that are solely focused on the mining industry and associated impacts are excluded. However, activities illustrating linkages with the Mining program are included.

Monitoring Implementation of Selected Recommendations

(Note: the recommendation numbers refer to those used in the NA report.)

Recommendation 1

Continue setting goals that are within the TI Research Program's scope and resources. Given its limited resources, the TI Research Program should continue a research focus and priority setting on goals that are well-defined, are based on rigorous surveillance data, and are complementary to work being done by stakeholders, extramural research partners, or other agencies.

Background

Status

In progress

External Factors

Occasionally congressional directives or unanticipated requests from other government agencies can result in TI Research Program resources being directed to activities that are not program priorities or explicit in the TI Strategic Plan goals. As a current example, in response to requests from the U.S. Department of Agriculture (USDA) Food Safety Inspection Service (FSIS) and the Occupational Safety and Health Administration (OSHA), the program is participating in a multi-year Health Hazard Evaluation (HHE) that is assessing the impact of increased poultry processing line speeds on worker safety. Though not encompassed per se in the TI Strategic Plan, it was important for the program to be responsive to this request and to help illuminate the worker safety implications of a proposed USDA rule[3] that would allow dramatic increases in line speed.

Implementation of Recommendation

Activity: Periodic Revision of the TI Strategic Plan and Goal Prioritization

Description

The TI Strategic Plan serves to focus program activities in directions that are likely to advance the program's mission. The plan provides guidance to NIOSH intramural and extramural scientists when conceptualizing and planning research projects and activities, helps management make informed decisions about the direction of the program given finite resources, and facilitates coordination of programs within the NIOSH portfolio. To ensure that the plan stays current and relevant, it is periodically revised and input is sought from extramural researchers and stakeholders.

The TI Strategic Plan encompasses intermediate and activity/output goals across 6 strategic subgoals. To maintain a strategic plan that addresses a reasonable breadth of traumatic injury research needs, while also ensuring progress on gaps and concentrated activities that can lead to measurable improvements in worker safety, the TI Research Program periodically prioritizes goals and activities. Factors that are considered in prioritizing goals include: the magnitude or emergence of a problem as evidenced by data; the breadth of the TI Research Program Portfolio and gaps; the immediacy of need expressed by OSHA or other critical stakeholders; and, the momentum of TI research on the course of research to practice.

Progress

The TI Strategic plan, developed in 2007 for the NA review, was revised in 2009 based on NA and BSC review, including the addition of a sixth goal on surveillance.[2] Although the 2009 TI Strategic Plan was posted on the NIOSH website and a docket was opened for public comment, no comments were received.

The 2009 TI Strategic Plan is currently being revised by interdivisional multidisciplinary workgroups addressing each of the six strategic subgoals: 1) fall prevention, 2) motor vehicle safety, 3) violence prevention, 4) machine and industrial vehicle safety, 5) high risk and vulnerable worker groups, and 6) surveillance. The workgroups are comprised of TI Steering Committee members complemented by staff across the Institute with relevant expertise. Workgroups are considering several inputs and factors, including: injury surveillance data; data and evidence of the changing nature of work; progression of research along the public health framework; progress on goals and activities by NIOSH, extramural researchers, other government agencies and stakeholders; and, NIOSH capacity, expertise and resources. An emphasis is being placed on goals with the greatest potential for impact, such as those that include Prevention through Design (PtD) principles and intervention evaluations. A specific objective of the current revision process is to develop a strategic plan that is more concise and focused with fewer goals overall.

Beginning in 2010, the TI Research Program and other NIOSH Programs began prioritizing goals to focus new research proposals and activities. Among the priority goals identified by the TI Research Program were goals focused on motor vehicle safety. These goals were prioritized based on an assessment that the program was inadequately addressing this leading cause of work injury death which spanned all industry sectors. In addition to prioritizing motor vehicle safety goals, NIOSH established a virtual Center for Motor Vehicle Safety[4] in December 2010 to help focus and garner interdivisional research on motor vehicle safety. Between 2009 and 2012, the TI Research Program has undertaken 32 projects that address motor vehicle safety goals. These projects are conducted in 7 NIOSH DLOs and extramurally. The projects span the research spectrum from surveillance, to risk factor identification, to intervention development and evaluation (including engineering controls), to transfer of research results to change practice. The projects address multiple at-risk worker populations, including truck drivers, fire fighters, emergency medical services workers, police, roadway construction workers, agricultural workers, oil and gas workers and home healthcare workers.

Impact

Periodic revisions will help ensure that the TI Strategic Plan is focused and commensurate with surveillance data, the evolving evidence-base of science, the changing nature of work, and NIOSH resources. Actively seeking input from extramural researchers and stakeholders will help ensure that the plan recognizes progress made outside of NIOSH, and that the plan and resultant research findings and products will be relevant to stakeholders who are critical in advancing NIOSH research into practice.

The potential impact of prioritizing goals and activities is illustrated by the considerable impacts in motor vehicle safety research in a short timeframe. Prioritizing motor vehicle safety goals and establishing the virtual NIOSH Center for Motor Vehicle Safety have contributed to numerous examples of others acting upon our research and recommendations (intermediate outcomes in NA terminology). These intermediate outcomes range from development of standards and policies at the international and national levels to changes in practice at the employer level. The following are selected examples:

- The United Nations' (UN) General Assembly proclamation, *Decade of Action for Road Safety 2011-2020*[5] makes specific reference to occupational road safety which has the potential to lead to improvements in worker road safety within the United States and globally. TI program staff participate on the UN Road Safety Collaboration, conveying findings from our research.
- The forthcoming International Organization for Standardization (IS0) standard, *Road Traffic Safety Management Systems – Requirements with Guidance for Use*, emphasizes public and private sector organizations as a key road user group within a comprehensive framework for ensuring the safety of the entire road system. TI Program staff serve on the US committee for this important activity.
- The American National Standards Institute (ANSI) standard, *Safe Practices for Motor Vehicle Operations* was revised in 2012[6] with considerable TI Program input. The revision includes strengthened safety-belt provisions, and new or expanded sections on journey management, impaired driving, and fatigue management. This standard is important because it provides guidelines for the safety of employees who drive for work, but who are not covered by the federal regulations that are applicable only to the operation of large trucks and buses.
- Several truck manufacturers are currently using program-collected anthropometric data on truck drivers to improve the safety and ergonomics of the next generation of truck safety cabs.[7] Manufacturers who have been provided access to these data and technical assistance include Freightliner, Volvo Trucks, and Daimler Truck North America.
- NIOSH surveillance grantees have contributed to informed public and employer policy, revised trucking regulations, improved highway safety planning and enforcement, and training tools. As one example, findings from fatality investigations conducted in Kentucky contributed to trucking companies adopting restraint systems for sleeper births and personnel policies to mitigate driver behavioral factors.[8]

Future Plans

The TI Research Program is working toward finalizing revisions to the TI Strategic Plan by early 2013. The program anticipates posting a draft revision to the NIOSH website in the fall of 2012, and actively seeking review and input to a NIOSH public docket. The opportunity to provide input on the plan will be announced through the NIOSH E-News, and notices will be sent to the more than 100 extramural attendees at the 2011 National Occupational Injury Research Symposium (NOIRS) and to the Consortium of Occupational State-based Surveillance Listserv that includes state occupational public health programs. Review and input will also be sought from agencies that regulate worker safety (e.g. OSHA and Department of Transportation (DOT)) to foster alignment of the plan with research needs of regulatory agencies.

The TI Research Program will continuously monitor the relevance of the strategic plan and formally review and revise the plan at least every 3 years, with the next revision planned for 2015. The program will continue to collect rigorous surveillance data to monitor and ensure the relevance and potential impact of plan revisions.

The program will continue to prioritize motor vehicle safety research in the near-term and anticipates periodic prioritization of other goals in the future to fill gaps in the TI Research Program portfolio, to ensure focused research that is likely to contribute to improvements in worker safety, and to see research through to practice.

Recommendation 2

Develop an explicit plan for each subgoal. The TI Research Program should develop an explicit, written plan within each subgoal for progression along the public health framework, including the circumstances under which work in the subgoal would cease. Additional considerations should be the relevant balance between risk factor and intervention research.

Background

Status

In progress

External Factors

None

Implementation of Recommendation

Activity: Development of an Explicit Plan for Each of the Traumatic Injury Subgoals

Description

There are currently six TI subgoals: 1) fall prevention, 2) motor vehicle safety, 3) violence prevention, 4) machine and industrial vehicle safety, 5) high risk and vulnerable worker groups, and 6) surveillance. Each subgoal includes intermediate goals (research results being used by stakeholders to improve worker safety) and activity/output goals (specific project-type goals). Intermediate and activity/output goals are based on stage of knowledge and research, and focus on phases of the public health framework needed to accomplish each goal. For goals where little research and progress towards prevention has been made (e.g., reducing injuries among vulnerable worker groups such as workers with physical disabilities), the focus is on surveillance and risk characterization and goals are included on intervention evaluation research to follow through the public health framework. For goals where a mature body of research exists, where the risks are known and promising prevention strategies have been developed (e.g. reducing workplace violence among high risk retail workers), the focus is on the later stages of the public health framework, such as intervention evaluation and transferring research to practice. For goals where risks and effective prevention strategies are known, but injuries persist (e.g. construction falls), there is a focus on continued research addressing design and human factors issues, and marketing and disseminating information to promote adoption of promising and/or proven prevention strategies.

Progress

When the TI Strategic Plan was revised in 2009, activity/output goals based on the status of research and following the public health framework were added. Workgroups that are currently proposing revisions to the strategic plan received guidance to consider: the progression of research in the past few years, the relative balance between risk factor and intervention research (recognizing that many injuries can be prevented without a complex analysis of causation), and performance measures to foster assessment of when goals have been achieved and should be retired. It is anticipated that the 2013 revision to the strategic plan will retire some activity/output goals and add other activity/output goals to advance the research along the public health framework.

Impact

The inclusion of intermediate and activity/output goals in the TI Strategic Plan provides an explicit plan that fosters progression of TI research along the public health framework. Periodic revisions to the plan provide a mechanism for refreshing goals, including retiring those that are no longer needed.

Future Plans

The draft revision to the TI Strategic Plan will be widely distributed to researchers and stakeholders this fall, and input sought through a public docket. Seeking researcher and stakeholder input will help ensure that the plan is consistent with the current state of knowledge.

Recommendation 3

Work with other federal agencies that support injury prevention and control research. NIOSH and its TI Research Program should work with senior leadership from other federal agencies to outline areas of collaboration and synergy; to identify opportunities to further the science of injury control and prevention and to reduce the burden of injury across populations, environments and products.

Background

Status

In progress

External Factors

There are incentives for some federal agencies to be enthusiastic about working with NIOSH and the TI Research Program. Agencies with a regulatory focus or programmatic responsibilities for worker safety, such as OSHA and DOT, can benefit from the scientific expertise that the program can provide. However, federal agencies' level funding and travel restrictions may decrease opportunities for collaboration and require agencies to find creative approaches for working together.

Implementation of Recommendation

Activity A: Routine Communication with Key Federal Agencies with Mutual Interests and Responding to Rulemaking and Technical Assistance Requests

Description

The TI Research Program participates in regular meetings, organized and led by the NIOSH Office of the Director, that discuss areas of mutual interest and potential collaborations with key federal agencies. This includes monthly teleconference calls with OSHA, and quarterly meetings between NIOSH, OSHA, the Mine Safety and Health Administration (MSHA), and the Environmental Protection Agency (EPA). Examples of traumatic injury topics discussed at these meetings include construction falls and the lethal use of methylene-chloride based products in bathtub refinishing which was identified by a NIOSH-supported surveillance program and OSHA.

The TI Research Program conducts routine communication with key federal agencies with specific interests in traumatic injury to: 1) identify synergies and potential collaborations, and 2)

communicate program findings with potential programmatic application by other agencies. This includes: leadership of a federal interagency task force on preventing workplace violence that meets annually; leadership of a federal interagency working group on preventing childhood agricultural injuries that meets twice annually; participation on the Centers for Disease Control and Prevention (CDC) leadership team addressing the Motor Vehicle Winnable Battle that meets every other month; twice-yearly meetings with the National Center for Injury Prevention and Control (NCIPC); approximately annual meetings with the Bureau of Labor Statistics (BLS); and participation in quarterly OSHA Compliance Assistance calls that include OSHA staff from national, regional and state offices. Additionally, program staff are in regular communication with the Department of Labor's Wage and Hour Division (WHD) around issues of child labor, the US Coast Guard (USCG) on fishing vessel safety, and the National Institute for Sleep Disorders Research on issues of fatigue and safety.

Finally, the program develops formal NIOSH comments on rulemaking that address worker safety and responds to requests for technical assistance from other federal agencies.

Progress

There are numerous examples of the TI Research Program's routine communication with key agencies leading to productive collaborative relationships, and fostering the use of program findings in worker safety efforts. The following are a few key examples:

- NIOSH, OSHA and others are collaborating on a multi-year National Campaign to Prevent Falls in Construction[9] launched this past spring. This campaign informed by TI Research Program science is pooling resources and taking advantage of each collaborator's networks and partnerships to send consistent authoritative messaging on preventing falls in construction.
- NIOSH and several federal agencies, including the Department of Justice, are finalizing a document that will provide guidance for preventing workplace violence in federal agencies.
- In 2011, NIOSH and OSHA co-branded a guide on preventing nail gun injuries[10] which pooled resources and expertise to provide and widely disseminate authoritative guidance on preventing this common construction injury. The NCIPC has featured this publication on their website[11] which has resulted in the document's safety message being widely available to nailgun users beyond workers, such as consumers who use nail guns in their homes.
- Program participation on the CDC Motor Vehicle Winnable Battle team has resulted in the addition of a goal specific to worker safety which complements pre-existing goals such as increasing seat belt use. The CDC Webpage associated with this effort[12] includes links to the NIOSH webpage on motor vehicle safety resulting in worker safety being acknowledged and addressed as a component of CDC's efforts to prevent motor vehicle injuries.
- Program products, including products from the Fatality Assessment and Control Evaluation (FACE) project, have been included in OSHA-developed resources for compliance officers.

The program regularly responds to federal agency requests for technical assistance and comments on proposed rulemaking. As examples, the program participated by invitation in the 2010 National Transportation Safety Board (NTSB) sponsored Fishing Vessel Safety Forum, and is providing technical assistance to the National Marines Fishery Service as they develop rulemaking.[13] As noted earlier in this document, the program is contributing to an HHE, in response to requests from USDA and OSHA, to assess the impacts of increased poultry processing line speeds on worker safety. In 2011, the program also provided technical assistance to the WHD who requested guidance on whether 16- and 17-year-olds could safely use patient lifting devices. Since 2009, the program has contributed to NIOSH formal comments on

rulemaking with worker safety implications, including: Federal Motor Carrier Safety Administration (FMCSA) rulemaking on hours of service of truck drivers, OSHA's 2011 proposed rule on recordkeeping, WHD's 2011 proposed rulemaking on agricultural child labor laws, and the Department of Labor's (DOL) 2010 proposed rulemaking to implement the YouthBuild Program.

Impact

The TI Research Program's routine communication with key federal agencies has identified areas of collaboration and synergy, leveraged resources, and contributed to expanded communication of findings and products. The program's engagement with the CDC Motor Vehicle Winnable Battle and NCIPC has contributed to worker safety issues being recognized in broader injury prevention efforts. Joint campaigns and products with other federal agencies have resulted in extensive coverage in the lay and business press and contributed to increased dissemination and awareness of these products.

The program's routine communication with other federal agencies has also resulted in program findings informing those agencies' prevention efforts. As examples, based on program recommendations, the WHD is now allowing youth to participate on patient lifting teams *when* the youth have received appropriate training and *when* supervised by a trained adult. The USCG is collecting information recommended by the program in their investigations of vessel losses to guide their prevention efforts, and they are focusing regulatory efforts on high risk fishing fleets identified by the program. And, program findings influenced NTSB recommendations for improving commercial fishing safety that include requiring vessel owner and skipper training in stability and mandatory use of flotation devices for workers while on deck.[13]

Finally, NIOSH comments on proposed regulations have contributed to regulations that better protect workers. Examples include 2012 changes to the YouthBuild Program which includes safety training and oversight,[14] and extensive improvements to child labor law regulations in 2010[15] that were largely based on earlier program comments and data.

Future Plans

The TI Research Program will continue regular communications with key agencies. There are several joint efforts that are pending, including a co-branded OSHA/NIOSH Alert on the hazards of using methylene chloride-based products in bathtub refinishing, and the posting of several under-development program products on the NCIPC website (e.g., a phone app on ladder safety, a motor vehicle safety youth fact sheet, and an on-line violence prevention course for nurses on the NCIPC website targeted to health care professionals).

The program will continue to respond to proposed rulemaking and requests for technical assistance, but will also be more proactive in obtaining advance notice of agencies' regulatory agendas and research needs. One mechanism for doing this is to seek input from regulatory agencies when updating and revising the TI Strategic Plan.

The program will also seek out additional agencies with which to develop relationships, strengthen existing relationships, and establish regular communications. Examples include agencies within DOT and the National Institutes of Health (e.g. National Institute of Aging and National Institute for Child and Human Development). Enhanced relationships with additional federal agencies have the potential to leverage resources, lead to collaborative research and increased funding for worker safety research, and expand worker injury prevention efforts.

Activity B: Routinely Seek Federal Agency Partnerships around Specific Research Areas and Projects

Description

The TI Research Program encourages, and project officers routinely seek, federal agency partnerships around specific research projects of mutual interest. This is done to leverage resources and expand the reach of products and recommendations. To encourage engagement with federal partners, the TI Strategic Plan specifically identifies other government agencies in intermediate goals and activity/output goals. Additionally, when the program management reviews new project concepts and plans, they recommend engagement of appropriate federal agencies when warranted. Project officers and program management regularly communicate findings to relevant federal agencies.

Progress

Nearly 50% of the current TI Strategic Plan's intermediate goals identify federal agencies among the groups that could act upon our research, with many identifying specific agencies such as OSHA. Additionally, nearly 20% of the plan's activity/output goals specify that federal agencies should be engaged.

There are numerous examples of projects that include federal partners and leverage resources. These include projects in which: other agencies provide NIOSH funds or share costs to conduct research activities of mutual interest, NIOSH provides funds to other agencies to take advantage of their infrastructure and minimize costs, and federal agency partners are involved in project design, conduct and dissemination efforts. The following are a few illustrative examples:

- A project to improve the crashworthiness of ambulances receives funding from the Department of Homeland Security (DHS), and the DHS, the National Institute for Standards Technology (NIST), the National Highway Traffic Safety Administration (NHTSA), the US Fire Administration (USFA), and the General Services Administration (GSA) are all involved in the project's design, conduct and dissemination efforts.[16]
- NIOSH provides funds to the USDA National Agriculture Statistics Service to use their farm operator survey infrastructure and established relationships with farm operators to collect data on childhood farm injuries and injuries to agricultural workers. This arrangement is much more cost-effective than if NIOSH was to conduct the surveys independently or contract out the survey design and data collection. USDA posts survey results on their website which helps extend the reach of these findings since farmers routinely access the USDA Website.[17]
- The Fire Fighter Fatality Investigation and Prevention Program works in close collaboration with other federal agencies with mutual interests in fire fighter safety, including NIST. In response to fatality investigations suggesting that Self Contained Breathing Apparatus' (SCBA) facepieces were thermally degrading in extreme fire environments while fire fighters were trying to escape, NIST conducted laboratory and field research which confirmed the findings. NIST has contributed to communication of these findings to fire service stakeholders.[18]

In Fiscal Year 2012, 36% of TI Research Program intramural projects identified federal partners. In addition to agencies identified above, these federal agency research partners included: OSHA and the OSHA Construction Directorate; WHD; Employment and Training Administration; FMCSA; Federal Highway Workers' Administration; Bureau of Transportation

Statistics; Federal Aviation Administration; NTSB; USCG; National Weather Service; US Forest Service; Consumer Product Safety Commission (CPSC); Veteran's Health Administration; Agency for Healthcare Research and Quality; Center for Medicare and Medicaid Services; and the Department of State.

Impact

Collaborations with other federal agencies result in new resources to conduct work at reduced costs that might not otherwise be conducted, foster the use of program results by other government agencies, and extend the reach of program recommendations. Examples of intermediate outcomes from these efforts are numerous and include:

- A nearly final National Fire Protection Association (NFPA) Standard for the manufacture of ambulances, which is the first such standard, will greatly improve the safety of workers in the ambulance patient compartment. This proposed new standard was largely influenced by NIOSH work with numerous federal partners including DHS, NHTSA, NIST and USFA.[19]
- A nearly final revision to an NFPA standard that will improve the thermal performance of SCBA facepieces, providing lifesaving improvements to SCBAs.[18]

Future Plans

When reviewing the draft TI Strategic Plan revision proposed by the subgoal workgroups, the TI Research Program management and steering committee will consider if federal agencies are appropriately identified in the intermediate goals (targets for use of our research) and activity/output goals (partners in research and outreach). In reviews of new project concepts, program management will continue to review proposed engagement with federal partners and encourage engagement with other promising federal partners when warranted.

Program management and project officers will continue to seek research partnerships with other government agencies on worker safety issues of mutual interest. As one example, the National Institute of Justice is currently considering, for funding in Fiscal Year 2013, two program proposals that would provide empirical data to guide efforts to prevent motor vehicle crash injuries among law enforcement personnel.

Recommendation 6

Ensure collaboration among NIOSH-funded researchers. NIOSH should review its practices and take steps to improve the opportunities for intramural and extramural, including state occupational public health programs, to communicate and collaborate without excessively directing extramural research to the detriment of scientific creativity. NIOSH should also further ensure collaboration and coordination among its programs, including the traumatic injury, construction, mining, and agriculture programs.

Background

Status

In progress

External Factors

Current governmental limitations on travel and conference spending have the potential to decrease opportunities for intramural and extramural researchers to meet in person and

develop and foster partnerships. Despite these barriers, NIOSH continues to find constructive ways to leverage existing resources to address priority occupational safety and health issues.

Implementation of Recommendation

Activity A: Increase Coordination between TI Research Program Management and the Office of Extramural Research Programs and Encourage Collaborations between Intramural and Extramural Researchers

Description

Linkages between the NIOSH Office of Extramural Programs (OEP) and intramural research programs have been strengthened, with the express purpose of fostering complementary intramural and extramural research programs and supporting mutually beneficial collaborations between intramural and extramural researchers. The OEP now routinely provides NIOSH program managers, including the TI Research Program, with summaries of awarded grants in their program areas, and an OEP staff person serves on the TI Research Program Steering Committee. This provides opportunities to identify complementary activities between the intramural and extramural research programs, and to pursue mutually beneficial collaborations. Additionally, OEP has a process and mechanism to include NIOSH staff for up to 5% of their time as unpaid consultants on extramural grant proposals.

The TI Research Program also commits staff time and funding to foster and support intramural and extramural collaborations in cooperative agreement programs, including the National Construction Center, Agricultural Safety and Health Centers, National Children's Center for Agricultural and Rural Health and Safety (Children's Center), and State-based Occupational Health and Safety Surveillance grants (a.k.a. state occupational public health programs). In all cases, there are close working relationships and regular communications between NIOSH program managers, staff and grantees, and in some cases specific projects to support coordination and collaboration.

Progress

The TI Research Program has a greater awareness of NIOSH extramural TI grants than in the past. Increased staff time and funding has been committed to provide technical support to and foster collaborations with state occupational public health programs, and to aid in the broad dissemination of grantee products. A prime example of this is the NIOSH website[20] which was established to serve as a clearinghouse for state products.

There is broad engagement of extramural researchers in NIOSH intramural projects. In Fiscal Year 2012, more than 44% of TI Research Program intramural projects identified extramural research partners. These include collaborations with state occupational public health programs, Agricultural Safety and Health Centers, the Children's Center, the National Construction Center, and university researchers. The scope of these collaborations range from research conception and implementation to dissemination of findings and products.

The following are a few illustrative examples of program intramural/extramural collaborations and products:

- The National Construction Center is one of the key collaborators in the National Campaign to Prevent Falls in Construction described previously. Additionally, state occupational public health programs are expanding the outreach of the campaign by developing related materials and referencing the campaign.[21]

- Program staff provided support and made substantial contributions to the Children's Center update of a national action plan that will provide guidance on future steps by the private and public sectors to reduce childhood agricultural injuries.[22]
- Program intramural staff have co-authored several articles with state occupational public health programs.[23-26]

Impact

The TI Program is better positioned to identify potential collaborations with extramural research partners. Collaborative work with the extramural community increases coordination and leverages resources. As one example, the collaboration between TI Research Program intramural staff and the Michigan FACE program on the use of methylene chloride-based products in bathtub refinishing led to involvement of OSHA, the identification of a larger problem not limited to Michigan,[27] and co-authoring of an MMWR article[23] that received substantial press coverage.

Coordinated and complementary work between intramural and extramural researchers improves worker safety. As one example, the program believes that documented reductions in childhood agricultural injury rates since 1998 (> 60%) can be attributed in part to the collaborative and complementary work of intramural researchers, extramural researchers, and the Children's Center that conducts extensive outreach to stakeholders.[28]

Future Plans

The OEP will continue routine communication regarding funded extramural TI grants to TI Research Program management. The program will consider this extramural research in revising the TI Strategic Plan, reviewing new project concepts, and in encouraging intramural and extramural collaborations. The program will continue committing staff time and resources to facilitate coordination and collaboration with cooperative agreement grantees.

Program management will seek to build relationships and collaborations with NIOSH supported Education and Resource Centers to leverage resources and work to increase the visibility of occupational injury research.

Activity B: Periodically Sponsor Meetings that Provide Opportunities for Intramural and Extramural Researchers to Communicate

Description

The TI Research Program sponsors the National Occupational Injury Research Symposium (NOIRS) on an approximate 3-year cycle (typical grant cycle) and has sponsored topic-specific meetings on occasion. These meetings bring intramural and extramural researchers together to present their latest research studies, methods and findings, and to network and identify potential collaborations.

Progress

The 5th NOIRS, co-sponsored by the National Safety Council and Liberty Mutual Research Institute for Safety, was held in Morgantown, WV in October 2011.[29] Informal feedback collected at the 2008 NOIRS was used in planning the 2011 meeting. The symposium was attended by more than 200 national and international scientists, with approximately 90 intramural staff from nine DLOs and more than 120 extramural attendees. The symposium featured more than 150 oral presentations and 41 posters, with at least 23 presentations or

posters authored jointly by NIOSH and extramural partners, including academic and government researchers. Topics and sessions focused on TI Research Program subgoals (e.g., preventing falls and motor vehicle-related injuries), industry sectors (e.g. agriculture, forestry and fishing; construction; healthcare; and, mining), and other NIOSH Cross-Sector programs (e.g., work organization, musculoskeletal disorders)**.**

The program also sponsored a fall prevention research conference in Morgantown, WV in May 2010,[30] attended by more than 180 scientists and practitioners from 11 countries. There were 35 intramural attendees and more than 150 extramural attendees. A published proceedings[31] includes 61 articles (3 co-authored by intramural and extramural researchers), and a special issue of the journal *Human Factors* published in June 2012 highlights key research presented at the conference.[32]

Intramural and extramural researchers also had the opportunity to interact at a NIOSH intramural/extramural workshop sponsored by the NIOSH Agriculture, Forestry and Fishing Program in August 2009 in Cincinnati, OH.

Impact

Meetings and symposia such as those described in the progress section above are important venues for creating a community of traumatic injury researchers, and providing intramural and extramural researchers the opportunity to learn more about each other's work, to meet and talk with each other during breaks, and to potentially identify collaborative work. The program received overwhelmingly positive feedback for the two conferences we sponsored, with many attendees expressing the value and need for such meetings.

The availability of abstracts and proceedings on the NIOSH Website, and publication of key research presented at such meetings in special issues of journals, helps to ensure that the research and findings presented at these meetings reaches a larger audience than just those who attended.

Future Plans

The TI Research Program is working with the National Safety Council to publish a special issue of the *Journal of Safety Research* that will highlight key science presented at the 2011 NOIRS symposium. The special issue is planned for release in late 2012.

The program is planning to hold NOIRS again in 2014, pending available funds and approval to hold the conference. Informal feedback collected at the 2011 NOIRS would be used in the conference planning, and the program plans to formally collect feedback at the next NOIRS to help in future planning and to document the impact of such meetings. Attendees would be queried on how the symposium will enhance their work, if attendance led to new professional relationships and partnerships, their suggested periodicity for the symposium, and how the symposium could be improved. The program would seek co-sponsorship as has been done in the past to leverage resources, and to draw a wider and more diverse set of attendees. Symposium announcements would be sent to current and past TI Research Program extramural grantees. The program will also explore holding virtual meetings that bring together intramural and extramural researchers using web-based technology. Subgoals (e.g., fall prevention research) could serve as one focus for such virtual meetings.

Activity C: Integrate and Coordinate the NIOSH TI Research Program with other NIOSH Programs

Description

To facilitate the integration and coordination of the TI Research Program with other NIOSH Programs, TI Research Program staff are members of NORA Sector Councils (e.g., Construction; Agriculture, Forestry and Fishing; Healthcare and Social Assistance; Services; and, Public Safety) and cross-sector steering committees (e.g. Surveillance; Communications and Information Dissemination; Global Collaborations; and, Occupational Health Disparities). In developing and revising the TI Strategic Plan, strategic plans from other NIOSH Programs are reviewed to identify mutual interests and to specifically include or encompass goals from other programs. Additionally, NIOSH holds program management (industry sector and cross-sector) meetings at least once yearly to facilitate interaction and identify synergies among the different NIOSH programs.

Progress

The integration of the TI Research Program with other NIOSH programs is illustrated by the overlap in strategic plans, and the extent to which TI Research Program projects address goals in other NIOSH program strategic plans. In the current TI Strategic Plan, 45 percent of the goals (strategic, strategic subgoals, intermediate, and activity/output) mirror or align with 138 goals in sector or cross-sector strategic plans. For example, the TI Strategic subgoal to reduce falls in the construction industry mirrors the first goal in the NIOSH Construction Strategic Plan, and the two strategic plans include numerous common or consistent goals to:

- develop and foster the use of a scientific base for fall protection designs, technologies, programs and communications; and
- conduct and act upon research to reduce fall risks among Hispanic construction workers.

In Fiscal Year 2012, all TI projects addressed at least one goal from an industry sector or another cross-sector program. For example, 35% of current TI projects also address goals in the Construction Sector Strategic Plan, 35% address goals in the Agriculture, Forestry and Fishing Strategic Plan, and 27% address goals in the Services Sector Strategic Plan. The recent re-review of the NIOSH Agriculture, Forestry and Fishing Program included numerous TI projects, and TI program staff gave presentations to the review panel on agricultural injury surveillance, childhood agricultural injury prevention, and tractor safety research. Most NIOSH cross-sector programs are being addressed in current TI projects. For example, 21% of TI projects address goals in the Surveillance Strategic Plan, 15% address goals in the Communications and Information Dissemination Strategic Plan, and 15% address goals in the Occupational Health Disparities Strategic Plan.

Impact

Coordinating and integrating with other NIOSH programs leverages resources and improves worker safety. For example, the integration of the TI Research Program with the NIOSH Construction Program has enhanced the National Campaign to Prevent Falls in Construction, by contributing products and increasing dissemination of information on the campaign.[9] The integration of the TI Research Program with the Agriculture, Forestry and Fishing Program likely contributed to the positive scores received by the program upon a review of its progress since its initial National Academies review.[33]

Future Plans

The TI Research Program will continue to coordinate and seek integration with other NIOSH programs. TI program staff will continue to participate on NORA Sector Councils and cross-sector steering committees, and industry and cross-sector Strategic Plans will be reviewed in TI Strategic Plan revisions. As an example of future integration efforts, the TI Research Program will work with the Agriculture, Forestry, and Fishing Program in implementing recommendations from the recent re-review of that program.[33] Also, pending TI Research Program products will be featured as part of the National Campaign to Prevent Falls in Construction. These include a phone app on ladder safety and a planned MMWR surveillance article on falls in construction co-authored by TI intramural staff and state occupational health programs.

Recommendation 9

Research prevention strategies for traumatic injuries in a changing workplace. The TI Research Program should consider research on the safety impact of changes in the nature of work as well as intervention research targeting organization policies and practices, including prevention through design approaches.

Background

Status

In progress

External Factors

While there are a variety of useful data sources for tracking changes in the nature of work, such as shifts in employment by industry sector and changes in worker demographics, some changes are more difficult to detect and track, such as changes in work organization.

Implementation of Recommendation

Activity A: Conduct Surveillance and Research to Identify Emerging Issues and Track Changes in the Nature of Work

Description

The TI Research Program conducts surveillance and research that identifies emerging issues and tracks some facets of changes in the nature of work. Intramural and extramural researchers, principally state occupational public health programs, routinely analyze population-based databases and report on trends in worker demographics, industries, occupations, hazards, injuries and deaths. The program includes case-based surveillance that provides richer data than that available from population-based databases. Case-based surveillance has been shown to be valuable in identifying emerging safety issues that would otherwise be masked in less detailed population-based surveillance. The TI program's case-based surveillance includes the Fire Fighter Fatality Investigation and Prevention Program and intramural and extramural FACE projects.

The program has also collected and analyzed contemporary anthropometric data on different worker populations. This research has demonstrated dramatic differences in current

working populations from the decades-old anthropometric data that is typically used in the design of personal protective equipment, clothing, and work vehicles.[34]

Progress

Intramural and extramural researchers have published analyses and products that address trends in employment,[35,36] farm hazards,[37] injured worker demographics and employment, and injuries.[20,24,25,36] In 2009, the program added and modified targets for fatality investigations in the FACE projects based on surveillance data demonstrating sizable numbers of deaths among foreign-born workers and growth in the energy industry. The pre-existing fatality investigation target of Hispanic workers was modified to focus on foreign-born workers and deaths in energy production was added as an investigation target. Additionally, several State-based FACE programs have additional investigation targets for fatalities on an upward trend, including deaths associated with renewable energy and older worker deaths.[38]

Both the FACE and the fire fighter fatality investigation projects have recently identified emerging worker safety issues. The identification by the Michigan FACE program of the emerging issue of methylene chloride-based products being used in bathtub refinishing has been described in earlier sections of this report. Another emerging issue identified by FACE is the use of highly flammable floor finishing products. The Massachusetts FACE program investigated the deaths of 3 Vietnamese workers in 2 separate incidents in a 10-month period.[39] An emerging issue identified by the fire fighter fatality investigation program has also previously been described. The problem with the thermal performance of SCBA facepieces has been attributed to increases in the intensity of fires associated with modern building construction and furnishings.[18]

The program has recently collected anthropometric data on truck drivers[7] and fire fighters[34] which demonstrates that these worker populations are larger than in the past. These data have been shared with manufacturers so that they can be used to improve the fit and safety performance of trucks and fire fighter personal protective equipment.

Impact

TI Research Program findings and products have contributed to increased awareness about emerging issues and efforts to improve worker safety. For example, findings and recommendations from an article on older worker injuries[25] co-authored by TI intramural and extramural researchers and BLS were cited in an article in the September/October 2011 issue of the AARP magazine, with a circulation exceeding 47 million readers. The article co-authored by intramural and extramural researchers, with OSHA, on the lethal use of methylene chloride in bathtub refinishing[23] was covered by several news outlets with large distributions, including: the Washington Post, Fox News, ABC News, CBS, Time, USA Today and US News and World Report. The TI Research Program and OSHA also communicated this hazard and prevention recommendations through their networks.[27]

TI Research Program data and findings on emerging issues have and are being used by others to improve safety. Spurred by the Massachusetts FACE program investigations of 3 fatally injured Vietnamese floor finishers, a statewide task force mobilized to prevent future deaths and injuries. Among numerous state-wide prevention efforts, in July 2010, Massachusetts banned the sale and commercial use of highly flammable lacquer sealers.[39] Revisions to the NFPA SCBA standard that will improve the thermal performance of SCBA facepieces is pending.[18] And as noted previously, manufacturers of truck cabs,[7] fire apparatus,

and fighter protective equipment and clothing are currently using program anthropometric data to develop vehicles, personal protective equipment, and clothing that better fit today's workers.

Future Plans

The TI Research Program will continue to use population-based and case-based surveillance data to identify trends and emerging issues, publish these findings in the scientific press, and communicate them to stakeholders, including other government agencies, standards bodies, manufacturers, employers and workers. The program will periodically refresh fatality investigation targets for the FACE program, considering surveillance data trends. The program will also work with the NIOSH Work Organization and Stress-Related Disorders Cross Sector Program to explore data sources that can provide trend data on work organization issues e.g., the Quality of Worklife Module. And, the program will continue to advance the design of work vehicles, equipment, personal protective equipment and clothing through the collection and analysis of contemporary anthropometric data, and the sharing of these data with manufacturers and standards bodies.

Activity B: Periodic TI Strategic Plan Revisions and Goal Prioritization to Ensure Research Consistent with a Changing Workplace and the Advancement of Intervention Research on Organizational Policies and Practices, Including Prevention through Design (PtD) Approaches

Description

In periodic revisions to the TI Strategic Plan, consideration is given to whether the plan adequately addresses changes in the nature of work, and if the plan appropriately emphasizes intervention research targeting organizational policies and practices, including prevention through design approaches. Periodic goal prioritization similarly considers the breadth of TI Program research in these areas, and if the research should be bolstered by goal prioritization.

Progress

The 2009 revision to the TI Strategic Plan included the addition of a strategic goal on surveillance which facilitates the collection of data to assess changes in employment patterns and worker demographics, and the expansion of goals on emerging and understudied high risk and vulnerable workers, including workers with physical disabilities and day workers. In addition, activity/output goals that were added in the 2009 revision included intervention evaluation, work organization research, and PtD approaches. The TI Strategic Plan is currently being revised by multi-disciplinary interdivisional workgroups that have received guidance to consider if goals adequately address the changing workplace and intervention evaluations of organizational programs and priorities, including PtD approaches.

The TI Research Program has prioritized goals between 2010 and the present that include intervention evaluations and PtD approaches. Of the current 3 priority goals for the TI program, one is centered on a PtD approach to design out fall risk or craft engineering solutions to control worker fall risk, and one calls for intervention evaluations targeted to high risk worker groups. Current TI research includes several projects that are evaluating organizational policies and practices and several PtD oriented projects. These include:

- Evaluation of interventions to prevent violence against health care workers, including an evaluation of a state regulation that requires specific organizational practices (e.g. written policies and specified training), and an evaluation of a program in psychiatric facilities that

also has work organization components (regularly-held group meetings of staff and patients to discuss violence).

- Evaluation of the effectiveness of municipal ordinances in preventing violence against convenience store workers, including how convenience stores made changes in their stores.
- A field-based evaluation of a comprehensive slip/trip and fall intervention in food services, with special attention to the impact of the employer providing slip resistant shoes.
- The previously discussed collection of anthropometric data on fire fighters and truck drivers which provides critical data for designing safer vehicles and equipment.
- Research to design and test engineering controls to prevent falls, including modifications to ladders to increase stability, and a guardrail device that can easily be installed in a variety of construction environments that present fall hazards.

Impact

Ensuring that the TI Strategic Plan encompasses research on the changing workplace, includes intervention evaluations of organizational policies and practices and includes PtD approaches, is expected to lead to an increase in such research projects intramurally and extramurally. Prioritizing goals is anticipated to lead to additional research in this area.

Previous PtD research and intervention evaluations of work organization policies and practices demonstrates the potential of this line of research. Previous research to develop an engineering control to prevent equipment rollovers is now included on commercial lawnmowers, better protecting workers who use this equipment. Research on patient lifting devices has led to the identification of programs that use these devices in conjunction with comprehensive organizational policies being considered "best practices," and numerous examples of these programs being adopted by healthcare organizations. The Traumatic Injury Research Program believes that this has contributed in part to reductions over time in back injuries among healthcare workers.[28]

Future Plans

The TI management and steering committee will review the revisions proposed to the TI Strategic Plan by the subgoal workgroups, and will make changes if warranted to ensure the plan addresses the changing workplace and includes intervention evaluations of work organization policies and practices. The program will seek input from extramural researchers and stakeholders to ensure the plan is consistent with current knowledge and that it will meet the needs of stakeholders. The program will consider future prioritization of goals consistent with this NA recommendation.

Research findings from this line of research will be published in the scientific literature and communicated to stakeholders, including designers, manufacturers, employers and their organizations.

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Appendix

Comments about recommendations not selected for ongoing review

Recommendation	Comments

Recommendation	Comments
#4: Improve surveillance of nonfatal injuries. The TI Research Program should develop a plan for improving surveillance of nonfatal injuries, integral to prevention and to strengthening the TI Research Program portfolio development. A comprehensive approach should go beyond use of employer-based data to include nonemployer-based data sources such as hospital data and other medical data systems, the National Health Interview Survey, and the Behavioral Risk Factor Surveillance System. The TI Research Program should involve other federal and state agencies in developing a cohesive interagency effort.	The TI Research Program is committed to working with federal and state partners to improve surveillance of nonfatal injuries. This is reflected in the addition of a Strategic Goal to the 2009 TI Strategic Plan and associated intermediate and activity/output goals (discussed under Recommendation #1). The TI Research Program works closely with the NIOSH Surveillance Cross-Sector Program in setting directions for future surveillance and exploring means to fill as many data gaps as possible given limited and decreasing resources. Strategies include utilizing existing data systems such as the National Health Interview Survey, piggybacking on other federal systems to reduce costs, such as NIOSH providing funds to CPSC to collect data on occupational injuries treated in emergency departments (a form of worker reporting), and pursuing the inclusion of work-relatedness variables in the evolving electronic health record. The TI Research Program is currently conducting research on the underreporting of work-related injuries which will provide insights into incentives and barriers to reporting injuries in a variety of systems, including employer-based systems. While the TI Research Program and the NIOSH Surveillance cross-sector program are committed to improving nonfatal injury surveillance, this goal was not chosen for tracking because the approach and data sources are still being defined.
#5: Work collaboratively with OSHA. An agency of particular importance and relevance to NIOSH is OSHA. The TI Research Program, along with NIOSH leadership, should continue to work with OSHA to identify areas of high priority research that NIOSH should undertake and to identify NIOSH research findings of particular salience for potential regulatory action by OSHA.	This recommendation was not selected for tracking because it overlaps with Recommendation #3 which was chosen for tracking. Specific work to increase collaborations with OSHA and examples of impacts are reported in Recommendation #3, and efforts to identify research of particular salience for OSHA rulemaking are described in Recommendation 1, Future Plans.

Recommendation	Comments
#7: Increase the visibility of traumatic injury research. NIOSH should embark on a program to increase the visibility of traumatic injury research in order to attract new researchers. Absent a significant increase in research funding, the TI Research Program can still attempt to influence the number of ERCs that have a focus on safety research and can still disseminate information about the quality, impact and scientific challenges of traumatic injury research, as well as the dynamic changes in the field that go beyond the confines of traditional safety engineering.	The TI Research Program appreciates the need to increase the visibility of traumatic injury research and seeks to do this through several avenues, including: - working with the evolving West Virginia University School of Public Health which is nearby to the NIOSH Division of Safety Research facilities; and - seeking to increase visibility of occupational injury research in the larger injury research field, including through partnership and increased collaborations with NCIPC. This recommendation was not selected for tracking because expectations for progress are tempered by resource constraints and uncertainty regarding the future of the ERCs. The Program plans to conduct outreach to ERCs to build relationships.
#8: Evaluate research-to-practice efforts. NIOSH should develop a strategic plan for evaluating its r2p efforts and for building the capacity to carry out and evaluate these efforts. Needed disciplines include behavioral sciences; organizational behavior; intervention effectiveness research; public health education; dissemination, implementation, and diffusion research; social marketing; and media advocacy.	The TI research program embraces the responsibility for facilitating research-to-practice. The TI Strategic Plan includes r2p activity/output goals for every strategic goal, and all projects are evaluated to ensure solid plans are in place to ensure that program findings and products are relevant to stakeholders who are critical for advancing NIOSH research into practice. As part of NIOSH's program planning system, the TI program actively documents outputs and associated intermediate outcomes which help in the assessment of efficient and effective transfer methods. This recommendation was not selected for tracking because the expertise needed exceeds the capacity of the TI Program. However, NIOSH as an Institute is moving forward in making an investment in this area using the current expertise available in the NIOSH Communications and Research Translation Office and through the expertise of the extramural community.